

REMARKS

Claims 1 – 39 are pending in the present Application. Claims 9 and 10 are withdrawn from consideration. Claims 19, 20 – 24, 28, and 33 have been amended, Claim 38 has been cancelled, and Claim 40 has been added, leaving Claims 1 – 8, 11 – 37, 39, and 40 for consideration upon entry of the present Amendment. The Specification has been amended to correct certain typographical errors.

Claim 19 has been amended to recite a “compound comprising a forensic authentication marker” merely for clarity purposes. Support for this amendment can be found in the claims as originally filed and at least in Paragraphs [0042] and [0044].

Claims 20-24 have been amended merely to be consistent with the amendment to Claim 19.

Claim 28 has been amended to correct a typographical error.

Claim 33 has been amended to recite a “substrate polymer” merely for clarity purposes. Support for this amendment can be found in the claims as originally filed and at least in Paragraph [0023]. Claim 33 has also been amended to include the elements of Claim 38, i.e., to recite a dynamic response authentication marker. Support for this amendment can be found in the claims as originally filed and at least in Paragraph [0024].

Claim 40 has been added. Support for new Claim 40 can be found in the claims as originally filed and at least in Paragraphs [0024], [0036], [0040], [0041], [0064], [0065], and [0072] to [0075].

No new matter has been introduced by these amendments. Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

Elections/Restrictions

The Examiner has acknowledged election of species and amendment filed on July 16, 2007. Claims 1 – 39 are pending in the application. However, the Office Action alleges Claims 23 and 24 recite different species from DMBPC, and alleges that there is no indication whatsoever that DMBPC can be a part of the polymer recited in claims 23 and 24. Thus, Claims 1 – 8, 11 – 20, 22 and 25 – 39 were considered on the merits. Applicants respectfully disagree.

In the response to the Restriction Requirement dated June 20, 2007, Applicants elected Claim 22, DMBPC as the miscible polymer. Applicants respectfully submit that Claim 20 (and hence independent Claim 1) are generic, and Claims 2 – 21 and 23 – 31 read on this election. It is also noted, however, that Claims 21, 23, and 24 also read on this election because Claim 22 states that the miscible polymer “comprises” the DMBPC, and hence can further comprise additional miscible polymers, as is further supported by the language of Claim 20: “and combinations comprising at least one of the foregoing miscible polymers”. Accordingly, Applicants respectfully submit that Claims 21, 23, and 24 also be considered on the merits.

Information Disclosure Statement

Applicants note that the Examiner has not considered the art submitted in the Information Disclosure Statement on July 14, 2005, specifically DE1011851 and EP0698419. Applicants respectfully request that the art submitted in this Information Disclosure Statement be considered and a fully initialed PTO Form A820 be returned to the Applicants.

Specification Rejections Under 35 U.S.C. § 112, First Paragraph

The specification is objected to as not written in such full, clear, concise and exact terms as required by the first paragraph of 35 U.S.C. § 112. In particular, the Office Action (OA) states such terms as “a forensic authentication marker”, “a dynamic response authentication marker”, as well as “forensic analytical technique” and “dynamic response analytical technique”, which are essential for understanding and performing the claimed method, are not defined clearly and unambiguously in the specification. (Office Action 09/25/2007, hereinafter “OA 09/07”, Page 2)

Applicants respectfully disagree and submit that each of the terms is defined sufficiently in the specification to comply with the first paragraph of 35 U.S.C. § 112. Forensic authentication marker is defined beginning in Paragraph [0036] of the specification. The OA states that forensic authentication markers are defined as “one or more organic or inorganic functional groups or structures that are not originally present in the chemical structural of the substrate polymer.” (OA 09/07, Page 2)

The OA alleges that it is not clear how that definition differs from that given for a dynamic response authentication marker and that it allegedly is not clear what the spectroscopic tags might be. (OA 09/07, Page 2) However, the definition given by the OA is not complete because the specification states further that when the organic or inorganic functional groups are incorporated with the substrate polymer, the result is a tagged polymer having a unique signal detectable by a forensic analytical method. (Paragraph [0036]) This differs from the definition for a dynamic response authentication marker in that a dynamic response authentication marker is defined as a spectroscopic tag, a thermochromic compound, and an optically variable tag. (Paragraph [0064]) The specification states that spectroscopic tags make it possible to determine thermal history and degradation of a polymer. (Paragraph [0065]) Paragraphs [0066] to [0076] further describe spectroscopic tags. Thermochromic compounds are described in the specification generally as compounds that change color as a function of temperature and are further described in Paragraphs [0077] to [0086]. Optically variable tags are described in the specification generally as fluorescent or luminescent materials that are selected to be chemically compatible with the polymer matrix and have a heat stability consistent with engineering plastics compounding and in particular with the processing conditions of the polymer substrate. Optically variable tags are further described in Paragraphs [0087] to [0098].

In addition, dynamic response authentication markers differ from forensic authentication markers because dynamic response authentication markers are detectable by dynamic response analytical methods, while a tagged polymer comprising the forensic analytical marker(s) has a unique signal detectable by a forensic analytical method. Forensic analytical methods, for example, include resonance spectroscopy methods, SEM-EDX, and XPS-ESCA, while dynamic response authentication methods include luminescence, fluorescence, vibrational, and electronic spectroscopy, visual observations under specific lighting conditions, and color spectrophotometry.

Accordingly, the specification meets the requirements of first paragraph of 35 U.S.C. §112. Reconsideration and withdrawal of this objection are respectfully requested.

Claim Rejections Under 35 U.S.C. § 112, First Paragraph

Claims 15 and 34 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. The OA alleges the specification does not disclose any “forensic analytical methods”, which allow detecting the forensic authentication marker in less than 0.005 weight percent (wt.%) of the total weight of the polymer. (OA 09/07, Page 5) The OA continues that the accuracy of integral error for NMR spectra are 10-15% and so it allegedly is not apparent as to how the forensic authentication tags can be detected in the amount of less than 0.005% from the total weight of the polymer. (OA 09/07, Page 5) Applicants respectfully traverse this rejection.

Applicants respectfully disagree and submit that the forensic analytical methods disclosed allow detection of the forensic authentication marker in less than 0.005 wt.% of the total weight of the polymer. The methods described in the specification are able to detect the forensic authentication marker in amounts as low as 10^{-14} wt.% by utilizing a solvent method and then concentrating the solvent. Thus, the forensic authentication tags can be detected in the amount of less than 0.005% from the total weight of the polymer. Claims 15 and 35 are enabled. Reconsideration and withdrawal of this rejection are respectfully requested.

Claim Rejections Under 35 U.S.C. § 112, Second Paragraph

Claims 1 – 8, 11 – 20, 22, and 25 – 39 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the OA alleges the claims recite subject matter that is not clearly and definitely disclosed in the specification. (OA 09/07, Page 5)

The Office Action states forensic authentication marker, dynamic response authentication marker, forensic analytical technique, and dynamic response analytical technique are not adequately defined in the specification, making the use of the terms in the claims indefinite. (OA 09/07, Page 6)

Applicants respectfully disagree and direct attention to the section above where the terms are discussed in regard to the specification objections. The terms are clearly and definitely defined in the specification. Thus, the terms are not indefinite. Reconsideration and withdrawal of this rejection are respectfully requested.

Claim 2-6 are rejected because it allegedly is not clear how an authentication marker can affect the optical property of the substrate material. (OA 09/07, Page 6) Applicants respectfully disagree and submit the claims are not indefinite, because optical properties of the substrate material can be affected by the authentication marker if the authentication marker reacts with the substrate material. Thus, Claims 2-6 are not indefinite. Reconsideration and withdrawal of this rejection are respectfully requested.

Claim 7 is rejected because it allegedly is not apparent which resonance spectroscopy methods are meant in the claim. (OA 09/07, Page 6) Applicants respectfully disagree and submit that Paragraph [0063] of the specification defines resonance spectroscopy methods as those such as nuclear magnetic resonance (NMR) and electron spin resonance (ESR). Claim 7 is not indefinite. Reconsideration and withdrawal of this rejection are respectfully requested.

Claims 11-15 are rejected because it allegedly is not clear as to how the weight percentage is obtained since in Claims 16 and 17 since the forensic authentication marker is recited as a functional group. (OA 09/07, Page 6) Applicants respectfully disagree and submit that Example 2 (Paragraphs [0128] and [0129]) and Figure 2 of the specification set forth results for identification of forensic authentication markers according to the disclosed methods. Specifically, Example 2 discloses solution state proton nuclear magnetic resonance (NMR) spectroscopy as the method used to quantify the type and quantity of the forensic authentication marker by dissolving pellet samples in a solution and then analyzing on a spectrometer. The characteristic peaks attributable to the functional groups on the forensic analytical marker were mathematically analyzed and the concentration was determined. NMR with peak integration as disclosed in the present application is a method commonly used and one that one skilled in the art would be familiar with and understand how to perform. As a result, Claims 11-15 are not indefinite. Reconsideration and withdrawal of this rejection are respectfully requested.

Claim 16 is rejected because it allegedly is not clear how it is possible to have a forensic authentication marker, which is an alkyl group of 2 or more carbon atoms that is not present in the polymer. (OA 09/07, Page 6) Applicants respectfully disagree and submit that Paragraph [0036] of the specification explains how it is possible to have a forensic authentication marker, which is an alkyl group of 2 or more carbon atoms, that is not present in the polymer.

Specifically, Paragraph [0036] states: “For example, although certain functional groups may be present in the substrate polymer, for example, methylene groups, it is an aspect of the disclosed methods that they may not be present in the substrate polymer in the same amount or configuration that gives rise to detection by a forensic analytical method.” Thus, Claim 16 is not indefinite. Reconsideration and withdrawal of this rejection are respectfully requested.

Claim 18 is rejected because it allegedly is confusing as to how the “forensic authentication marker” can be “a polymer having a forensic authentication marker”. (OA 09/07, Page 6) Applicants respectfully disagree and submit that Claim 18 recites, “...the compound comprising a forensic authentication marker is a polymer having a forensic authentication marker”. Paragraph [0042] of the specification explains differences between compounds and polymers. Specifically, Paragraph [0042] states “Compounds comprising one or more forensic authentication markers may be in the form of monomers, compounds, oligomers, or polymers.” Claim 18 is not indefinite. Reconsideration and withdrawal of this rejection are respectfully requested.

Claim 19 has been amended to recite a compound comprising a forensic authentication marker. Thus, the rejection based on use of the word “polymer” has been rendered moot. Regarding the rejection based on the limitation “wherein the polymer is miscible with polycarbonate,” Paragraph [0044] of the specification refers to miscible as “a polymer that upon incorporation with the substrate polymer shows no phase separation at the concentration levels for the compound disclosed herein.” The definition explains how one polymer can be miscible with another polymer. Thus, Claim 19 is not indefinite. Reconsideration and withdrawal of this rejection are respectfully requested.

Claims 20 and 22 are rejected because it allegedly is not clear which copolymers are recited in the claims. (OA 09/07, Page 7) Applicants respectfully disagree and submit that Paragraph [0042] of the specification defines copolymer as: “Copolymer as defined herein refers to a material having more than ten total repeating units wherein at least two of the repeating units are different. Copolymer and polymer are used interchangeably herein.” The claims disclose DMBPC copolymer, DDDA copolymer, eugenol-siloxane-polycarbonate copolymer, and ITR-PC copolymer. These are the copolymers recited in the claims. Thus, Claims 20 and 22 are not

indefinite in light of the definition in the specification. Reconsideration and withdrawal of this rejection are respectfully requested.

Regarding Claim 28, the claim has been amended to recite 10^{-18} . Claim 28 is not indefinite. Reconsideration and withdrawal of this rejection are respectfully requested.

Claim 33 is rejected as allegedly not being clear in regards to performing the step of authentication of a tagged article. (OA 09/07, Page 7) The OA alleges that Claim 33 states the article should not be destroyed in order to be authenticated because the examples in the specification comprise dissolving the material to analyze the polymer with NMR spectroscopy, which allegedly contradicts the subject matter of Claim 33. (OA 09/07, Page 7) Applicants respectfully disagree. Claim 33 recites a method of authenticating an article comprising

incorporating together a polymer and a compound comprising a forensic authentication marker to make a tagged polymer, the forensic authentication marker being present in the tagged polymer in an amount sufficient to be detected by a forensic analytical technique,

forming a tagged article from the tagged polymer, and
authenticating that an article is a tagged article by detecting the forensic authentication marker using a forensic analytical technique.

Applicants respectfully submit the examples simply illustrate one embodiment of the present application and should not be read to limit the claims. One skilled in the art would understand that forensic analytical techniques such as NMR, XPS-ESCA, and ESR, can be used to provide a determination of the structure of the forensic authentication marker as opposed to measuring a signal such as fluorescence or absorption. As a result, Claim 33 is not indefinite. Reconsideration and withdrawal of this rejection are respectfully requested.

Claim 33 is also rejected because it allegedly is not clear what the step of “incorporating together a polymer and a compound comprising a forensic authentication marker” comprises. (OA 09/07, Page 7). Applicants respectfully disagree and submit that Paragraph [0107] of the specification discusses methods for incorporating the forensic authentication and dynamic response authentication markers into the substrate polymer such as compounding, solution casting, admixing, blending, or copolymerization. Applicants also submit that one skilled in the art would understand the meaning of “incorporating together a polymer and a compound...”. Claim 33 is not indefinite. Reconsideration and withdrawal of this rejection are respectfully requested.

Claims 36 and 38 are rejected as reciting a limitation that does not have antecedent basis. (OA 09/07, Page 7) Applicants respectfully submit that Claim 33, from which Claims 36 and 38 depend, has been amended to recite a substrate polymer thus rendering the rejection to these claims moot. Reconsideration and withdrawal of this rejection are respectfully requested.

Claim 39 is rejected as allegedly having the same flaws in its recitation as the preceding claims. (OA 09/07, Page 7) Applicants respectfully disagree and submit that Claim 39 is not indefinite for all the reasons discussed above. Reconsideration and withdrawal of this rejection are respectfully requested.

Claim Rejections Under 35 U.S.C. § 102(b)

Claims 1 – 8, 11 – 14 and 16 – 19 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by Patent No. GB 1,487,967 to Livesay. (OA 09/07, Page 7) Applicants respectfully traverse this rejection.

The OA alleges Livesay discloses a method for authenticating that a test polymer is a tagged polymer, with a tagged polymer comprising any one of the polymers disclosed on pages 1 and 2, the tags comprising microparticles of a distinctive shape or size and comprising specifically coded tagging elements. (OA 09/07, Page 8)

Applicants respectfully disagree and submit that the claims are not anticipated by Livesay. To anticipate a claim, a reference must disclose each and every element of the claim. *Lewmar Marine v. Varient Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987).

Livesay discloses

an explosive composition comprising an explosive material and microparticles of a tack-free organic carrier which does not have a softening point below 60 °C, which microparticles have a distinct shape having one or more tagging elements in an amount of at least 0.1 percent of the total weight, and which are capable of surviving detonation of the explosive material and so permit retrospective identification of the explosive although it has been detonated.

(Claim 1) Livesay fails to disclose various elements of the claims including, “[a] method of authenticating that a test polymer is a tagged polymer, said tagged polymer comprising a substrate polymer, a compound comprising a forensic authentication marker, and a dynamic response authentication marker...” (Claim 1) Livesay also fails to disclose “...testing the test polymer for the forensic authentication marker using a forensic analytical technique...” or

“...testing the test polymer for the dynamic response authentication marker using a dynamic response analytical technique...” and “authenticating that a test polymer is a tagged polymer if the forensic authentication marker and dynamic response authentication marker are detected.”
(Claim 1)

Livesay fails to disclose both a forensic analytical marker detectable by a forensic analytical technique and a dynamic response analytical marker detectable by a dynamic response authentication technique and thus does not teach Applicant’s claimed combination. As a result, Claim 1 is novel. The dependent claims add further patentable distinction and are also not anticipated by Livesay. Reconsideration and withdrawal of this rejection are respectfully requested.

Claims 1 – 6, 16 – 19, 30 – 31, 33 and 35 – 39 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by Matsumoto et al. (Matsumoto) “A clone preventive technique which features magnetic micro-fibers and cryptography”, SPIE, 1998, Vol. 3314, pages 275-286. Applicants respectfully traverse this rejection.

The OA alleges Matsumoto teaches

a clone preventative technique which features magnetic micro-fibers and cryptography, comprising incorporating micro-fibers containing iron oxide particles..., which can be detected with micro fibers detector..., into polymer substrate such as polycarbonate..., and using the digital signature utilizing asymmetric cryptography.

(OA 09/07, Page 8) Applicants respectfully disagree and submit that the claims are not anticipated by Matsumoto. To anticipate a claim, a reference must disclose each and every element of the claim. *Lewmar Marine v. Varient Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987).

The OA alleges the micro-fibers in Matsumoto are the forensic analytical marker, detected with a micro-fibers detector, which allegedly is the forensic analytical technique, using a digital signature, which allegedly is a physical dynamic response authentication marker, utilizing asymmetric cryptography allegedly the dynamic response analytical technique. (OA 09/07, Page 8) Applicants respectfully disagree and submit that Matsumoto does not disclose a dynamic response authentication marker as recited in the present claims. The present claims disclose “a compound comprising a forensic authentication marker, and a dynamic response authentication marker” (Claims 1, 33, and 39). Matsumoto discloses micro-fibers and a digital signature.

Applicants respectfully submit that micro-fibers and a digital signature as disclosed by Matsumoto, are not a compound comprising a forensic authentication marker and a dynamic response authentication marker. There is no anticipation since Matsumoto at least fails to disclose “a compound comprising a forensic authentication marker, and a dynamic response authentication marker”.

Accordingly, Matsumoto does not teach Applicant’s claimed combination. Therefore, Claims 1, 33, and 39 are not anticipated by Matsumoto. The dependent claims add further patentable distinction and are also not anticipated by Matsumoto. Reconsideration and withdrawal of this rejection are respectfully requested.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1 – 8, 11 – 20, 22, and 25 – 39 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,099,930 to Cyr et al. (Cyr), in view of U.S. Patent No. 6,001,953 to Davis et al. (Davis), and U.S. Patent No. 6,411,208 to Buess et al (Buess). Applicants respectfully traverse this rejection.

The OA alleges Cyr teaches methods for marking digital compact discs as a means to determine its authenticity where the methods comprise incorporating a near infrared fluorophore into the CD.... (OA 09/07, Page 9) The OA also states that a fluorophore is a dynamic response authentication marker, but admits that Cyr does not teach a different forensic authentication marker or using a different analytical technique for forensic authentication. The OA then alleges that it would have been obvious to use the material in Davis, which discloses various compositions used for manufacturing optical articles based on polycarbonates, including DMBPC. (OA 09/07, Page 10) The OA concludes that it would have been obvious to use the composition of the articles as an authentication signature since the content of such compositions is optimized for obtaining the best properties required for specific applications of CDs because such analytical techniques as NMR or NQR are allegedly well known for obtaining authentication signatures as disclosed by Buess. (OA 09/07, Page 10) The OA states it would have been obvious to use two authentication techniques for such molded articles as CDs—one based on fluorescence detection as in Cyr and a second based on the specific composition of the CD material disclosed by Davis. (OA 09/07, Page 10)

Applicants respectfully disagree and submit that a *prima facie* case of obviousness has not been established. For an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior art relied upon, or knowledge generally available in the art at the time of the invention, must provide some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). “A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). To find obviousness, the Examiner must “identify a reason that would have prompted a person of ordinary skill in the art in the relevant field to combine the elements in the way the claimed new invention does.” *Id.*

Applicants respectfully submit that there is no motivation, prompting, or suggestion to combine the references in the manner suggested in the OA. Applicants submit that in determining the differences between the prior art and the claims, the question under 35 U.S.C. §103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. MPEP § 2141.02, citing *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983) Here, the OA relies on Davis simply to disclose that DMBPC can be used in a composition of polycarbonate. Additionally, what Buess discloses is a method where the target material is identified twice, first by piezoelectric resonance and second by NMR or NQR.

In Applicants specification, the forensic analytical marker is detected by a forensic analytical technique and the dynamic response authentication marker is detected by a dynamic response authentication technique. The references relied upon by the OA fails to disclose detecting a forensic analytical marker with a forensic analytical technique and detecting a dynamic response authentication marker with a dynamic response authentication technique. Furthermore, by using both a forensic authentication marker and a dynamic response authentication marker, a multi-level determination of authenticity can be accomplished. Buess fails to remedy the multiple deficiencies of Cyr and Davis and further fails to provide the motivation to combine these references. Thus, there is no motivation or suggestion to combine

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the references as suggested by the OA. The present claims remain novel and non-obvious over the art of record.

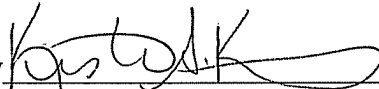
If an independent claim is nonobvious under 35 U.S.C. §103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). Since Applicants have traversed the rejections of Claims 1, 33, and 39, the dependent claims are, as a result, non-obvious. Reconsideration and withdrawal of this rejection are respectfully requested.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the objection(s) and rejection(s) and allowance of the case are respectfully requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 07-0893.

Respectfully submitted,

CANTOR COLBURN LLP

By 
Krista A. Kostiew
Registration No. 60,297

/Pamela J. Curbelo/
Pamela J. Curbelo
Registration No. 34,676

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CANTOR COLBURN LLP
20 Church Street, 22nd Floor
Hartford, CT 06103
Telephone (860) 286-2929
Facsimile (860) 286-0115
Customer No.: 43248